GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. A-3462 GTRI/~~GIT~~ DATE 1/31/83

Project Director: Thomas F. McGowan ~~School~~/Lab TAL/WESD

Sponsor: Georgia Office of Energy Resources; Atlanta, GA 30334

Type Agreement: Contract dtd. 12/15/82

Award Period: From 12/15/82 To ~~6/30/83~~ 12/31/83 (Performance) _____ (Reports)

Sponsor Amount: Total Estimated: $ _____ Funded: $ 3050

Cost Sharing Amount: $ _____ Cost Sharing No: _____

Title: "Follow-on to Builder's Energy Workshop"

ADMINISTRATIVE DATA

OCA Contact John W. Burdette x4820

1) Sponsor Technical Contact:

2) Sponsor Admin/Contractual Matters:

Georgia Office of Energy Resources
270 Washington St.
Atlanta, GA 30334

Ms. Robin Meyer

Defense Priority Rating: N/A

Military Security Classification: N/A

(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached _____ Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with None proposed

COMMENTS:

COPIES TO:

Research Administrative Network
Research Property Management
Accounting
Procurement/EES Supply Services
Research Security Services
Reports Coordinator (OCA)
GTRI
Library
Research Communications (2)
Project File
Other McGowan
Other _____

ORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date January 5, 1984

ject No. A-3462 ~~School~~/Lab TAL

ludes Subproject No.(s)

ject Director(s) Thomas F. McGowan GTRI / ~~GIT~~

nsor Georgia Office of Energy Resources

le Follow-on to Builders Energy Workshop

ective Completion Date: 12-31-83 (Performance) (Reports)

nt/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

ntinues Project No. Continued by Project No.

PIES TO:

ject Director
search Administrative Network
search Property Management
counting
curement/EES Supply Services
search Security Services
~~orts Coordinator (OCA)~~
gal Services
Library
GTRI
Research Communications (2)
Project File
Other

rm OCA 60:1028

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

February 3, 1983

Ms. Robin Meyer
Georgia OER
270 Washington St/Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462/Homebuilders Energy Conservation Project

Dear Robin:

Attached is the December-January progress report for the Homebuilders Energy Conservation project. Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan, Chief
Energy Technology Branch

TFM/jb

Attachment

Monthly Progress Report

December 15, 1982 through January 31, 1983
Homebuilders Energy Conservation Project
Contract No. A-3462-000

The period from December 15 through the end of January was spent organizing the Kennesaw owner/builder workshop and the housing rehabilitation workshop to be given in Tifton. A meeting was held with Elaine Mays, a housing rehabilitation coordinator in Thomasville, on January 17. Phil Whitlow and Robin Meyer were present to discuss the unique energy needs of housing rehabilitation and how they differ from new, speculative construction. Also covered were key people to invite and discussion of the location of current rehabilitation efforts for audience notification. A tenative date of March 15 has been set for this workshop.

The Kennesaw workshop has sufficient pre-registration to make the presentation on Saturday, February 5.

I attended a demonstration of house sealing with new foam caulk hosted by W.R.Grace Company on 1/18. The information presented on infiltration reduction was worthwhile and it appears that this technique has entered the mainstream of the insulation subcontractor sector, but is not yet in widespread use in new house construction.

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

March 8, 1983

Ms. Robin Meyer
Georgia OER
270 Washington St., Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462, Homebuilders Energy Conservation Project

Dear Robin:

Attached is the February progress report. Major items were the presentation of the Kennesaw owner-builder workshop, and planning for the Housing Rehabilitation Workshop in Tifton in March. Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan, Chief
Energy Technology Branch

TFM/jb

Attachment

Monthly Progress Report
February 1983

Homebuilders Energy Conservation Project
Contract A-3462-000

The major work accomplished this month was an owner-builder workshop at Kennesaw Community College on February 5. It was held under the auspices of the Continuing Education department. Attendance was 17, primarily owner-builders or owner-renovators. An evaluation form (supplied by Kennesaw College) was filled out by the participants. The results were quite positive, indicating a real need for more workshops for this sector. The results were transmitted by letter on February 18; a copy is attached for file purposes.

The work for next month is a workshop in Tifton on March 15 for housing rehabilitation inspectors, planners, and contractors. Phil Whitlow with OER is coordinating the activity. Tom McGowan will check with housing rehabilitation contacts to define their needs.

Kennesaw College has extended an invitation to produce (at their cost) a 30-minute videotape of the workshop material. Robin Meyer and Tom McGowan will investigate this opportunity on March 8 with their Department of Continuing Education.

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

February 18, 1983

Ms. Robin Meyer
Georgia OER
270 Washington St., Room 615
Atlanta, GA 30334

Dear Robin:

A copy of the "Kennesaw College Participant Evaluation Form" is enclosed, and a summary of the evaluation responses by the attendees at the February 5th workshop. Fifteen people filled out forms, although there were two more in attendance.

As you can see, the results are quite positive. It would seem appropriate to expand our coverage of the owner-builders audience in the future.

Sincerely,

Thomas F. McGowan, Chief
Energy Technology Branch

TFM/jb

Enclosure

Kennesaw College
Continuing Education

Participant Evaluation

is is the question sheet for your evaluation of our Continuing Education courses. Your sponses need to be recorded on the brown answer form supplied by your instructor. Please not mark on this form and give responses only in pencil on the answer card. Thank you your evaluation and suggestions for course improvement. Additional comments can be tten on the back of the answer card in the white space. Do not put your name on answer rd, but put course title for subject.

How did you first hear about this course

9 A. Received brochure
0 B. Newspaper announcement or article
0 C. Radio or television announcement
3 D. Recommended through friend or organization
3 E. Other

Which statement best described how close this course was to your interests and backgroun

1 A. Too advanced
2 B. Right level, but not my main interests
2 C. Very understandable and interesting
0 D. Too basic

Which statement comes closest to stating your reaction to the course

0 A. One of the most valuable educational experiences in my life
8 B. An outstanding course, I received very much
7 C. Some parts valuable, others are not
0 D. I gained something from attending, but less than expected
0 E. It was a waste of my time

What was your main purpose in attending the class

4 A. Expand my knowledge of the subject
0 B. To meet with friends
1 C. To develop myself professionally
0 D. To help get a better job
0 E. To meet people

7) please indicate your evaluation of the Instructor

His/her knowledge of the subject

A. Superior. B. Good. C. Average. D. Fair. E. Poor
13 2

His/her attitude toward students

A. Superior. B. Good. C. Average. D. Fair. E. Poor
11 3 1

His/her effectiveness of teaching

A. Superior. B. Good. C. Average. D. Fair. E. Poor
12 3

Did your class start and end on time? A. Yes. B. No.
8 5

(Questions to be answered on the back of brown answer form)

What would have most improved this course? Please see attached.

Suggestions for topics for future classes.

Number of responses from participants.

Response to Participant Evaluation
February 5, 1983
Homeowners Energy Conservation Workshop

Question	Total Number of Responses for Each Possible Answer				
	A	B	C	D	E
1	9			3	3
2	1	2	12		
3		8	7		
4	14		1		
5	13	2			
6	11	3	1		
7	12	3			
8*	8	5			

*Had one no-response for Question 8; minor scheduling problem arose due to Continuing Education Department change in time listings.

Responses for Question 9 . . . What would have most improved this course?

- "more of same"
- "more on passive hot water systems through roof on south side, etc.; could also use more time total. Talk on value of solar (sunrooms) and/or greenhouses separately or combined."
- "make it longer"
- "short interval question periods"

Responses for Question 10 . . . Suggestions for future classes?

- No responses.

15 responses from 17 in attendance.

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

April 6, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street, Room 615
Atlanta, GA 30334

Re: Georgia Tech Project A-3462, Homebuilders Energy Conservation Project

Dear Robin:

Attached is the March progress report. Major items were the presentation of the Housing Rehabilitation Workshop in Tifton, and our meeting with Kennesaw College regarding videotaping. Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan, Chief
Energy Technology Branch

TFM/jb

Attachment

Monthly Progress Report
March 1983

HOMEBUILDERS ENERGY CONSERVATION PROJECT
Contract A-3462-000

The workshop for Housing Rehabilitation Specialists was held on March 15 at the Rural Development Center in Tifton, Georgia. An agenda is attached, as well as the registration list of the 27 people who attended. The presentation was well received. It is apparent that a primary problem in housing rehabilitation is the amount of money allocated for energy improvements. The builders energy manuals may help them to judge the relative merits of these improvements and to justify the energy expenditures.

Robin Meyer and Tom McGowan met with the Kennesaw College Department of Continuing Education on March 8 regarding videotaping the workshop presentation. It will take about one week's time to produce a 30-minute segment for Cobb Cable TV and for reuse by OER through other channels. This is outside the scope of this contract, but will be considered as a follow-on activity.

This progress report completes all work under this contract, with the exception of a final report. This will not be written until the end of the contract period, June 30, 1983.

Registration List for Energy Efficient Housing Workshop

Tifton - March 15

1.	Rudloph Smith	Alapaha
2.	Suzanne Boggus	Fitzgerald
3.	Katrina Dorminy	Fitzgerald
4.	Pauline Tyalor	Fitzgerald
5.	Wendell Bryant	Douglas
6.	Robert Bivens	Douglas
7.	Emmitt Bell	Eastman
8.	Mark Hall	Eastman
9.	Samuel Tucker	LaGrange
10.	William Stargell	LaGrange
11.	Pete Gardner	S.E. Georgia APDC
12.	Steve Engle	Middle Georgia APDC
13.	Carol Schuchmann	Middle Georgia APDC
14.	James McLeod	Cartersville
15.	Bobby Roberts	Cartersville
16.	Wylene Redmond	Waycross
17.	Owen Gay	Thomasville
18.	Bill Sutton	Thomasville
19.	Henry A. Smart, Sr.	Wadley
20.	Mayor B.A. Johnson	Wadley
21.	Arthur George	DCA
22.	Jann Henry	DCA
23.	Dennis Jones	DCA
24.	Brian Williamson	DCA
25.	Tommy Driver	Middle Flint APDC
26.	Herman Baker	Wadley
27.	Lee Cash	DCA

AGENDA

ENERGY CONSERVATION FOR HOUSING REHABILITATION
Tuesday, March 15
Rural Development Center
Tifton, Georgia

8:30 a.m.	Registration
9:00 a.m.	Introduction by Phil Whitlow Georgia Office of Energy Resources
9:15 a.m.	Presentation by Tom McGowan Georgia Tech
9:30 a.m.	Insulation QUESTIONS Infiltration and Control QUESTIONS
10:30 a.m.	Coffee Break
10:45 a.m.	HVAC, Equipment, State Energy Code QUESTIONS Woodstoves QUESTIONS The Energy Package - A Summary QUESTIONS
NOON	Lunch
1:00 p.m.	Solar Bank Information

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

May 18, 1983

Ms. Robin Meyer
Georgia OER
270 Washington St./Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462 - Homebuilders Energy Conservation Project

Dear Robin:

The April progress report is attached. This month was spent preparing a paper for presentation at the American Solar Energy Society meeting on June 2, 1983, and for two similar (local) presentations in May. A proposal was prepared for a follow-on contract to make presentations to owner builders.

Please call me at 894-3636 if you have any questions.

Sincerely yours,

Thomas F. McGowan, Chief
Energy Technology Branch

TFM/jb

Attachment

Monthly Progress Report
April 1983
Contract A-3462-000

HOMEBUILDERS ENERGY CONSERVATION PROJECT

This month's progress consisted of preparing papers and presentations. A 30-minute condensed version of the three-hour workshop was prepared in slide form. This will be used for the Georgia Solar Energy Association meeting on May 12 in Atlanta, for a Western Electric technical seminar in Atlanta on May 31, and for the American Solar Energy Society (ASES) meeting in Minneapolis, Minnesota on June 2 and 3. A paper has been prepared for the ASES meeting; a copy is attached.

Other tasks accomplished this month were filing of new slides on older home renovation, handling myriad phone calls from builders, owner-builders and renovators, and sending out manuals on requests. Letters requesting the manuals have been more frequent than in past years. In addition, we have received requests from states outside of the Southeastern region (e.g., a recent request from a New Jersey architect). Apparently, the word is getting out, and may in part be due to the new format, typesetting, and artwork. I received a call from Jane Lehman, a reporter with the Atlanta Journal/Constitution requesting a review of utility energy efficiency plans. I reviewed documents delivered to me and gave her input for a column in the Home&Gardens section for the May 8, 1983 Sunday paper.

A proposal has been written for follow-on workshops and updating of presentation materials.

BUILDING AND MARKETING ENERGY EFFICIENT HOMES

Thomas F. McGowan
Georgia Institute of Technology
Engineering Experiment Station
Technology Applications Laboratory
Atlanta, Georgia 30332

ABSTRACT

The residential sector of our economy consumes one-fifth of the energy used in the U.S. Recent experiments in constructing energy conserving homes have found 50% to 75% reduction in energy use easily achievable, while adding less than 3% to the selling price of the house. Education of the builder and developer is the key to implementing these new construction techniques in the mass housing market.

For the past four years, the State of Georgia has funded a project to inform builders of the economics of energy efficient construction and the new construction methods needed to implement them. The project includes a series of workshops, publication of an updated manual, a vest pocket guide for field use, a slide presentation, and exhibition of materials and equipment (1,2).

This paper covers the major elements of energy efficient construction aimed at the southeastern region and tailored to the range of climates found in Georgia.

1.0 INTRODUCTION

Energy costs in the residential sector have risen due to rapid price increases in oil followed by deregulation of natural gas. Homes heated and cooled electrically have also experienced significant utility cost increases. The best way to minimize these costs are during the design and construction of a new home.

For this reason, the State of Georgia's Office of Energy Resources has funded a four-year project to educate homebuilders in energy efficient construction techniques. Emphasis is placed on cost control, and economic return on the materials and equipment used to achieve low energy use. An "energy package" approach is used for planning. This package covers four major areas:

- Adequate insulation, properly installed
- Reduced air infiltration
- Proper sizing and installation of heating and cooling systems
- Use of passive solar techniques

Marketing is covered via cost summaries and ratios of extra cost to total cost. Included are cash flow analysis and utility cost projections.

2.0 ENERGY EFFICIENT CONSTRUCTION

The major elements for energy efficient construction are insulation, leak sealing, HVAC systems, and addition of alternate fuels. These are examined in detail below.

2.1 Thermal Insulation and Vapor Barriers

Thermal insulation is used to retard the flow of heat. Houses lose and gain heat in three ways: conduction, convection, and radiation. Common insulating materials reduce heat flow by conduction; they have little effect on radiant and convective heat transfer.

There are two benefits of adding thermal insulation:

- Money and energy are saved. Less heat is lost in the winter, and less air conditioning is needed in summer.
- More comfort is provided. Walls, ceilings, and floors will be closer to the temperature of the air in the room, rather than to the conditions outside.

The primary insulation materials used for residential construction are fiberglass or mineral wool, treated cellulose, and rigid foam boards on sheets. Detailed descriptions will not be given here, but instead, a discussion of relative cost data.

2.2 R-Value and Cost of Materials

R-value represents the resistance of the insulation to heat flow: the higher the R-value, the better the insulating capability of the material.

The cost of insulation varies widely from one type to another (e.g., rigid board vs. fiberglass). Less variation is found for different brands of the same material. Installation costs are the same for some materials (fiberboard or rigid foam sheathing); for materials which come in different forms (e.g., blown vs batt fiberglass), costs vary according to installation methods and time requirements.

Note that you are trying to buy resistance to heat flow, not thickness of material. The material which is lowest in cost per R-value is always the best buy if the installation cost is the same for both materials. Table 1 gives recent prices for commonly used insulation. These prices vary with time, locality, and thickness of material and are only an approximate guide. Rigid foam prices are based on 3/4" thick sheets and batts and loose fill on 3-1/2" thickness. These are contractor prices for Atlanta, March 1982. It is improbable that all these materials would be used in building a house; the table provides a comparison to aid in choosing the best material for the specific application.

TABLE 1

COST COMPARISON OF INSULATING MATERIALS

Material (not including installation)	Approximate Cost (¢/sq. ft. per R-Value)
"Thermax," "High-R," or "Tuff-R"	5.7
"Styrofoam"	5.4
White bead board (unfaced)	3.6
Glass fiber--batts or blankets	1.4
Glass fiber -- blown	1.1
Cellulose	0.8
Fiberboard sheathing	8.8
Plywood sheathing	30.0

2.3 Vapor Barriers

Vapor barriers are needed to prevent water vapor from passing through the wall, ceiling, or floor, wetting the insulation. An adequate vapor barrier must be installed, but do not use a more expensive vapor barrier system than the wall sheathing and insulation requires.

Lack of vapor barrier, improper installation, or damage can lead to condensation causing:

- Loss in insulating efficiency
- Blistering, peeling, and cracking of paint
- Warping and buckling of siding and sheathing
- Corrosion and staining
- Mildew and odor
- Deterioration in framing, sheathing, and siding
- Wet interior wall surfaces

Use of a better barrier than necessary adds cost and increases chances of moisture retention in the house, causing sweating of windows, mildew, and rot.

To allow some vapor transmission, do not use polyethylene vapor barriers in ceilings or for wood frame floors (unless special construction/materials require it).

Table 2 lists the minimum vapor barrier required with various insulation systems:

TABLE 2

VAPOR BARRIER APPLICATIONS

Type of Vapor Barrier	Adequate for
Asphalt coated Kraft paper	Batt or blanket fiberglass, all but foil-faced sheathing
Foil-backed gypsum board	Ceilings--where blown insulation is to be installed
Polyethylene film 4-mil	All above, plus all rigid foam sheathing with or without foil facings except "Thermax" or "High-R" or "Tuff-R; also use as ground cover in basement
Polyethylene film 6-mil	All above, plus "Thermax," High-R," and "Tuff-R"

The vapor barrier is always placed toward the heated side of the building (i.e., against the drywall of walls and ceilings, up against the floor for crawlspace installation.

2.4 Infiltration

Infiltration may account for 40% of the heating and cooling load of a well-insulated house. Sealing methods for the major leakage points are shown below.

2.4A Toe Plate. Apply a bead of caulk between it and the flooring during

installation or caulk the interior crack between toe plate and flooring after it is secured.

2.4B Sill Plate. Use "sill sealer", a 1" thick fiberglass material, and unroll it along the top of the foundation before the sill plate is bolted down to form a gasket between the sill plate and foundation. Three companies make this product in 1" x 3-5/8" and 1" x 6" rolls; they are CertainTeed, Johns-Manville, and Owens/Corning.

2.4C Electrical Outlets. Caulk the wire and pipe holes where they penetrate the upper and lower wall plates, and pack wall insulation behind the outlet boxes on exterior walls. Use foam switch and outlet gaskets under the coverplates.

2.4D Duct Systems. Tape all seams before applying duct insulation; caulk or tape where duct fits in rough opening at room registers.

2.4E Windows. Pack the shim space between the rough opening and the frame with insulation and cover with a vapor barrier or fill the space with wet foam.

2.4F Range Vent, Dryer Vent, Bath Vent. Use a vent with a back draft damper. Seal the area around the duct where it penetrates the wall; tape all joints.

2.4G Fireplace. Use glass doors in front and exterior combustion air ducts.

2.4H Doors. Use foam core insulating doors with superior weatherstripping. Avoid the use of sliding glass doors.

2.4I Recessed Lights. Avoid the use of recessed spotlights; they must be ventilated to reduce heat buildup, thereby increasing infiltration.

2.4J Attic Access. Insulate and weatherstrip pull-down stairs or scuttle hole.

2.5 HVAC & Appliances

Approximately 70% of a typical utility bill is spent on heating and air conditioning the house. Of major importance to the builder and heating contractor is selection and installation of properly sized equipment for an individual house. Calculation of the heating/cooling load for a particular house will determine the type and size of equipment to be selected. Once the system has been sized, the builder must also address the problems of duct design and insulation, zone control, and ventilation to ensure the most efficient system for the house.

For high energy efficiency, the following rules must be observed:

- Properly size heating and cooling systems; do not oversize.
- Select high-efficiency units (on air conditioner, SEER above 9).
- Add features such as pilotless ignitions and setback thermostats to increase seasonal efficiency.
- Seal and insulate all ductwork in attics and basements; install balancing dampers in major ducts.
- Install oil- and gas-fired furnaces and hot water heaters outside the conditioned space; if installed inside, supply them with outside air for combustion.
- Choose household appliances with better than average efficiency ratings (check Energy Guide label); do not install unneeded appliances.
- Do not use power attic ventilators; use natural attic ventilation instead.

3.0 ALTERNATE FUELS - SOLAR AND WOOD

3.1 Passive Solar Heating

If designed as a passive solar system, larger amounts of glazing can add to the value of the house and reduce winter heat bills. Typical designs are sunspaces, attached greenhouses, and glazed-in breezeways.

Table 3 shows the expected heating bill savings with various glass/floor area ratios for well insulated houses. Higher glass ratios can lead to overheating; choose more conservative designs while gaining experience.

TABLE 3

PASSIVE SOLAR ENERGY SYSTEM SAVINGS

Glass Portion of South Wall (% of floor area)	W/O Night Insulation	W/R-9 Night Insulation
5	22	30
10	37	59
15	49	67
20	57	77

3.2 Heating with Wood

Wood is a relatively cheap, renewable fuel which is available today. The fireplace is a

familiar extra in many homes being built presently. In the future, more people may choose a woodstove or a more efficient fireplace in order to reduce heating bills and provide security against energy shortages.

The safe installation of woodstoves depends on adherence to applicable building codes. Installation cannot be dealt with here; the reader is directed to The National Fire Protection Association Booklet 211. Another comprehensive reference is Safe and Warm Wood Heat, a 40-page installation and operating manual produced by Georgia Tech for the Tennessee Valley Authority. It is available free from the Georgia Office of Energy Resources (3).

4.0 ECONOMIC ANALYSIS

The first question people ask when confronted with the option of building or buying an energy efficient house is, "How much extra will it cost me?" This question was answered by comparing payback periods of typical construction with improved methods. The results show that R-values of 26-38 are optimum for ceilings; approximately R-19 for walls (based on rigid foam sheathing) and R-11 to R-19 for underfloor installation. These vary slightly with fuel type and specific construction. Foam core insulated doors and storm or double pane windows are also indicated.

Three typical house plans were analyzed for overall cost. They ranged from 1,200 to 2,200 square feet, using electricity or natural gas fuels. Extra costs were estimated to be $0.62 to $1.08 per square foot for the energy package, with annual savings of $266 to $458 in utility bills per 1,000 sq ft of house. Payback periods were less than four years.

5.0 CONCLUSIONS

There is a lot to know about building an energy efficient home. This paper is but a summary of the 50-page manual and vest pocket guide produced under this program. The following list of design tips is offered as a summary for builders.

DO:

- Consider site orientation and shading
- Choose compact house designs
- Use a package approach
- Use a cash-flow sales approach
- Use tested materials and products
- Check subcontractor work

DON'T:

- Allow oversizing of equipment
- Install needless appliances
- Make inflated claims
- Outprice yourself from the market

6.0 ACKNOWLEDGEMENTS

The author gratefully acknowledges the continued support of this project by the State of Georgia, Office of Energy Resources.

7.0 REFERENCES

(1) McGowan, T.F., A Builder's Guide to Energy Efficient Homes, Georgia Tech/Georgia Office of Energy Resources, Atlanta, Georgia, 1982 Edition.

(2) McGowan, T.F., Homebuilders Energy Pocket Guide, Georgia Tech/Georgia Office of Energy Resources, Atlanta, Georgia, 1982 Edition.

(3) Georgia Office of Energy Resources, 270 Washington Street, S.W., Room 615, Atlanta, Georgia, 30334, 404/656-5176.

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

June 14, 1983

Mr. Robin Meyer
Georgia OER
270 Washington Street, Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462 - Homebuilders Energy Conservation Project

Dear Robin,

The May progress report is attached. Of special note are two one-hour presentations made to Western Electric and the Georgia Solar Energy Association on Energy Efficient Construction.

Please call me at 894-3636 if you have any questions.

Sincerely yours,

Thomas F. McGowan
Chief, Energy Technology Branch

Monthly Progress Report
May 1983
Contract A-3462-000
HOMEBUILDERS ENERGY CONSERVATION PROJECT

A condensed version of the 3-hour workshop was presented to the Georgia Solar Energy Association on May 12 and to Western Electric on May 31. The turnout was about 15 and 110, respectively. A thank-you letter from Dennis Coughlin at Western Electric is attached.

I prepared a one-page handout "Practical Tips on Reducing Home Utility Bills" for use at Western Electric. A copy is attached for your files; you may want to consider reproduction as an energy fact sheet.

I reviewed documents from Jane Lehman at the Atlanta Constitution on Energy Efficient Construction. Her article was printed on May 8 in the Home and Garden section; a copy is attached. As an outgrowth of this inquiry, I have contacted Joe Pruett of the Georgia Power Company for an update on the "Good Cents Home" construction standards.

Other miscellaneous items were contract negotiations for follow-on work and planning for the June 14 Athens workshop.

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

Practical Tips on Reducing Home Utility Bills

by

Thomas F. McGowan, PE
Georgia Tech EES

1. Think about energy use!
   Turn off, turn down appliances, heat and A/C systems when not needed.

2. Make sure you have adequate attic insulation (R-26 to R-30 in this climate).

3. Consider storm windows and under floor insulation.

4. Adequate attic ventilation and light-colored roofs help cut air conditioning loads. Use ridge and soffit vents, avoid power ventilators.

5. Consider whole house fans (which mount in the ceiling). They cool the house and flush the heat from the attic and reduce the need for air conditioning.

6. When replacing air conditioners, buy one with an SEER of 9.0 or higher. When replacing a gas furnance or range, get a pilotless ignition system and consider the new more efficient furnace designs.

7. Remember - your goal is to reduce your comfort bill - a composite of utility bills and capital expenditures. Don't buy expensive gimmicks or over spend in any one area.

   If done properly, the cost to upgrade an existing house in $1 per ft.^{2} of floor space. If you spend wisely, you will be rewarded with a more comfortable home as well as lower utility bills.

Western Electric

Atlanta Works

2000 Northeast Expressway
Norcross, Ga. 30071
404 447-2000

JUN - 3 1983

MR. T. F. MCGOWAN
Technology Applications Laboratory
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Ga. 30342

Dear Tom:

Thank you for your presentation of 5/31/83 on "Building and Renovating Energy Efficient Homes", to over one-hundred and ten of our Technical-Professionals. Your presentation and the three handouts you provided were universally well received. Not only was the subject matter of immediate impact, but, as usual, your presentation style was outstanding.

Once again, thank you, and if we can be of any help to you in the future, please contact me.

Sincerely,

D. J. COUGHLIN
Local University Representative
to Georgia Tech

Copy to:
Dr. D. J. Grace, Director -
Engineering Experiment Station
Dr. T. E. Stelson, Vice President for
Research, Georgia Tech
Dr. J. M. Pettit, President -
Georgia Tech

More homes boast seals of efficiency

New endorsements help market hidden features that save utilities

□ WHAT'S ON THE MARKET 3J

By H. Jane Lehman
Staff Writer

You don't see, feel, taste, smell or hear it. Consequently, builders have a difficult time selling it.

We're talking about insulation hidden behind the drywall, a vapor barrier sheathing under flooring, the upgrading of the air conditioner and furnace, caulking obscured by window frames, the solid core inside the door. In short, any of the features that keep the hot air out in summer, the cold air out in winter and the utility bills down the year-round.

The builder knows these energy saving features eventually pay for themselves several times over. The problem is the extra expense at the front end that can easily add $3,000 to the selling price of a new home. Too often buyers opt for the uninsulated house: it is either less expensive or the extra money has gone into the exotic whirlpool bath or fancy kitchen stove.

The answer for some builders is to join forces with a utility or manufacturer who will endorse his homes because it has been built to that company's standards for energy efficiency. But more important for the builder, the sponsor will promote that fact with site signs, educational programs for the public and mass advertising.

Seven years ago, Georgia Power Corp. took the lead locally with its Good Cents Home program. Recently, Cobb Electric Membership Corp. and Owens/Corning Fiberglas have taken up the banner.

And more certification programs are planned for the near future. Atlanta Gas Light is considering launching such a program next year. Coweta-Fayette Electric Membership Corp. hopes to get its Home for All Seasons program off the ground this year. Meanwhile, Douglas Electric Membership Corp. is looking to revive its program that fizzled five years ago.

Not surprisingly, the job of educating the public to the desirability of energy efficiency has fallen largely to utilities. After all, these are the companies left to deal with the woebegone buyer who discovers after six months of fuel bills that an awful lot of money is seeping out the cracks.

Of course the utilities benefit if they can reduce the peak demands for power. They must have the capacity all yearlong to handle these surges, but the peaks occur only a day or two out of the year.

Similarly, the manufacturers that

SEE Energy 5J ➡

SUNDAY, MAY 8, 1983 The Atlanta Journal

Energy

FROM 1J

give energy efficiency advice to builders or institute a certification program do so to promote their product lines.

Georgia Power is credited with successfully equating its Good Cents Home program with energy efficiency in the minds of a good number of Atlantans. Since its inception, the Good Cents certification has been awarded to 8,973 houses and 15,576 apartments, condos or townhomes in Georgia.

Cobb EMC's Energy Management Construction program has been playing to rave reviews since its introduction in January. The utility serves major portions of Cobb and Cherokee counties and parts of Fulton, Bartow and Paulding counties not served by Georgia Power or other utilities.

"The plan is very comprehensive without being a burden to the builder and homeowner," said Tom McGowan, a Georgia Tech senior research engineer in the energy technology area.

"Cobb EMC really has improved on things Georgia Power has spent a lot of money on developing. What we have is an evolution," said Frank Pritchard, who built the first Cobb EMC home.

Certification programs are based either on prescribed construction standards, like Cobb EMC's concept, or, in the case of Georgia Power, on a formula that matches up the energy features needed to offset heat gain or loss.

Cobb EMC's program dictates that homes m contain minimum insu tion levels, infiltration c trols, ventilation, va barriers, insulated or sto windows, insulated do and a heat pump. (A h pump replaces the furna and air conditioner. sucks the heat from t outside winter air a circulates it indoors, b eliminates the heat and h midity of indoor summ air and disperses it o side.)

Georgia Power's origin version of the Good Cen Home is based on formula determining t

THE ATLANTA CONSTITUTION 5

amount of efficiency needed in an air conditioner to offset a house's heat gain. Beyond sizing the air conditioner, the only requirements are R-26 insulation in the ceiling or R-19 in a vaulted ceiling.

In January 1982, Georgia Power began giving builders the option of building to a prescriptive standard. The newer version requires R-30 insulation in the ceilings, R-15 in the walls, R-11 in the floors and double-

dows. Insulated metal doors are recommended.

No distinction is made, however, as to which approach a builder used to qualify as a Good Cents builder.

The utility also is considering implementing a stiffer Good Cents standard in 1984 which would replace the two existing programs.

David Todd wanted to be recognized for the energy efficient homes he builds

is outside of Georgia Power's service area. So he turned to Owens/Corning Fiberglas to back his claim.

Todd plans to build 100 homes over the next 2½ years based on the insulation manufacturer's Energy Performance Design Service program. The standards call for R-30 insulation in the attic, R-15 in the walls and R-11 in the floors. The major emphasis of this program however is the com-

on each house as to it annual heating and coolin bill.

In the past year, 1 homes locally have bee certified under this pro gram.

The firm shortly wil introduce its "therma crafted" home program that will require doubl pane windows and incorpo rate a performance stand ard, said Steve Morrison with Owens/Corning

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

July 11, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street, Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462 - Homebuilders Energy Conservation Project

Dear Robin,

The June progress report is attached. It summarizes our progress on procuring information for the factsheets, obtaining new demonstration samples and presentation of the Athens workshop.

Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/lmk
Encl

Monthly Progress Report
June 1983
Contract A-3462-000

HOMEBUILDERS ENERGY CONSERVATION PROJECT

A 3-hour evening workshop was presented June 14 in Athens, Georgia. It was sponsored by the Northeast Georgia Area Planning and Development Commission and coordinated by Bill Herringdine. Approximately 30 people attended and the results of the workshop were positive. A summary of the Workshop Evaluation Questionnaires is attached, with 12 people responding. One area for improvement is the workshop time schedule. The workshop ended 15 minutes late; this problem can be solved by moving up the coffee break and limiting the duration of the break.

We have made progress in obtaining fresh samples from insulation manufacturers for the workshop demonstration materials. We are also attempting to put together a single box to contain them during transport for easier unpacking and better longevity.

We are inventorying our literature for the "furnace replacement" and "wood stove catalyst" fact sheets. Information has been requested from a range of sources and is now being received.

Preliminary arrangements have been made for a July 21 workshop at Lockheed - Georgia from 5:00-7:00 p.m. This 2-hour workshop will require the elimination of some material normally presented in the 3-hour format. Final arrangements will be made prior to the workshop.

June 14 Athens Workshop

Workshop Evaluation

N=12

This questionnaire is for your evaluation of this workshop on Energy Efficient Home Construction. Please circle the appropriate statement next to each question. Room is provided at the bottom of the page for additional comments and suggestions.

1. How did you first hear about this course?

4 A. Received brochure or poster
0 B. Saw a poster
3 C. Newspaper announcement or article
3 D. Radio or television announcement
1 E. Recommended through friend or organization
1 F. Other

2. Which statement best describes how close this course was to your interests and background?

1 A. Too advanced
2 B. Right level, but not my main interests
8 C. Very understandable and interesting
1 D. Too basic

3. Which statement comes closest to stating your reaction to the course?

0 A. One of the most valuable educational experiences in my life
6 B. An outstanding course
4 C. Some parts valuable, others are not
2 D. I gained something from attending, but less than expected
0 E. It was a waste of my time

4. What was your main purpose in attending the class?

10 A. Expand my knowledge of the subject
0 B. To meet with friends
2 C. To develop myself professionally
0 D. To help get a better job
0 E. To meet people

(5-7) Please indicate your evaluation of the instructor:

5. His/her knowledge of the subject

A. Superior	B. Good	C. Average	D. Fair	E. Poor
5	7	0	0	0

6. His/her attitude toward students

A. Superior	B. Good	C. Average	D. Fair	E. Poor
5	7	0	0	0

7. His/her effectiveness of teaching

A. Superior	B. Good	C. Average	D. Fair	E. Poor
3	7	2	0	0

8. Did your class start and end on time? A. Yes 5 B. No 5

(1 @ no answer
1 @ "Almost!")

Workshop Evaluation--Comments

Talked too fast. Informative but not quite up to expectations.

Diagram on the slides should be identified as to being in the book or not and those in the book being presented in the same format. I wasted time looking for some diagrams to make notes on only to find they weren't in the book and my concentration was broken--ideas lost.

Hands on the insulation material.

More time.

Very good workshop.

A-3462

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

August 1, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street, Room 615
Atlanta, GA 30334

RE: Georgia Tech Project A-3462--Homebuilders Energy Conservation Project

Dear Robin,

The July progress report is attached. Major work this month included the Lockheed/Georgia workshop, planning for 5 more workshops and preparation of the outline for the furnace and woodstove catalyst factsheets.

Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/lmk
Encl

Monthly Progress Report
July 1983
Contract A-3462-000

HOMEBUILDERS ENERGY CONSERVATION PROJECT

A 3-hour evening workshop was presented to 46 people at Lockheed-Georgia in Marietta. Shirley Jones was our contact at Lockheed and handled the meeting arrangements. Since a total of 160 people signed up for the workshop, we decided to limit the audience to 50 people to allow for answering questions and stimulating discussion. Twenty-two of the attendees filled out the course evaluation form; a summary of the results is attached. Due to the highly favorable reaction, I have scheduled a second workshop for Tuesday, August 23 from 4:30-7:30 p.m. Ms. Jones will contact people on the original list rather than reopen enrollment.

A proposal has been written and sent to OER for 5 more workshops. These include the Lockheed workshop mentioned above, and a Gwinnett County workshop on October 6. Three other workshops will be scheduled as opportunities arise, with the Warner Robins area currently under consideration.

We have received fresh insulation samples from Dow Chemical Co. Follow-up phone calls have been placed to other manufacturers and arrangements made for expediting delivery.

Calls have been placed to the gas and electric companies to collect data on new furnace cost and cost of maintenance. We are also contacting firms which offer service contracts to assess maintenance cost and equipment lifetime.

We have compiled data on woodstove catalysts and will be contacting manufacturers for detailed information. Preliminary outlines of the catalyst and furnace factsheets are attached.

Outlines for Factsheets

Choosing a Home Furnace

- Introduction
- Discussion/definition of natural gas, electric, heat pump furnaces (and connection with air conditioning)
- Installed cost of replacement furnaces
- Maintenance costs
- Expected lifetime (replacement cycle)
- Fuel costs
- Total cost of ownership
- Effect of new, more efficient systems
- Effect of existing system and its condition on overall planning

Woodstove Catalytic Converters

- Introduction
- Operation and design
- In-stove vs. retrofit models
- Efficiency increase
- Longevity and maintenance
- Cost and economics
- Reduction in creosote and air pollution
- Manufacturers' information

Summary of Workshop Evaluations

Lockheed (N = 28) (Place)

July 21, 1983 (Date)

1. How did you first hear about this course?
   - 19 a. Received brochure or poster
   - 0 b. Saw a poster
   - 0 c. Newspaper announcement or article
   - 0 d. Radio or television announcement
   - 0 e. Recommended by friend or organization
   - 9 f. Other:
     - 4 - Nat'l Mgmt. Assoc. flyer
     - 1 - wife
     - 1 - Lockheed
     - 1 - no answer
     - 1 - company ad
     - 1 - company-sponsored workshop

2. The level of the material presented in the course was
   - 0 a. Much too advanced
   - 1 b. Too advanced
   - 27 c. About right
   - 0 d. Too basic
   - 0 e. Much too basic

3. The content of the material presented in the course was
   - 22 a. Exactly what I was looking for
   - 6 b. Somewhat related to my interests, but not entirely
   - 0 c. Interesting, but not what I wanted
   - 0 d. Mostly useless to me

4. The written materials that were handed out were
   - 28 a. A valuable addition to the presentation
   - 0 b. Interesting, but not well integrated with the presentation
   - 0 c. Not very helpful

5. Which statement best describes your overall rating of the course?
   - 27 a. It was very valuable.
   - 1 b. Some parts were valuable, but others were not.
   - 0 c. It was a waste of time.

6. What was your purpose in attending the class? *
   - 2 a. To develop myself professionally in my present work
   - 9 b. Personal interest, to expand my knowledge of the subject for possible future use
   - 2 c. I intend to buy a house
   - 17 d. I intend to build a house
   - 5 e. I am renovating an existing house
   - 2 f. I want to decrease utility bills

(7-9) Please indicate your evaluation of the instructor:

Knowledge of subject		Attitude toward students		Effectiveness	
28	a. Superior	23	a. Superior	24	a. Superior
0	b. Good	5	b. Good	4	b. Good
0	c. Average	0	c. Average	0	c. Average
0	d. Fair	0	d. Fair	0	d. Fair
0	e. Poor	0	e. Poor	0	e. Poor

*Several participants gave multiple answers to this item.

10. What would have most improved this course? Add any additional comments.

More exmaples of what builders do wrong or get by with to save them money and how to catch it.

Divide up in smaller time segments and have more discussion.

Would like to see much more on underground homes, underground "cool" rooms--venting information, methods, passive solar--any way to better cool in summer.

(Added to #2, level of material) Excellent.

Definition of terms.

(Added to #2, level of material) Depends on the group.

Presentation should be two hours give or take fifteen minutes.

Too short for my purposes--suggest expansion.

Very good--I enjoyed it very much.

Hard to improve on.

A handout on specific requirements for different types of sheathing, insulation--lots of information was given very rapidly--a written summary would help.

OK for time allocated.

Excellent presentation.

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

September 15, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street
Suite 615
Atlanta, GA 30334

Re: Georgia Tech Project A-3462, Homebuilders Energy Conservation Project

Dear Robin:

The August Progress Report is enclosed. The major tasks for this month were the presentation of a second workshop for Lockheed-Georgia and preparations of the drafts of the factsheets on wood-stove catalysts and home furnaces.

Please call me at 894-3636 if you have any questions.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/pk

Enclosure

Monthly Progress Report
August 1983
Contract A-3462-000

HOMEBUILDERS ENERGY CONSERVATION PROJECT

A workshop was presented to Lockheed-Georgia Personnel on August 23. Approximately 45 people attended. Many of them had received the two workshop manuals before the meeting and asked more advanced questions than usual. On the workshop evaluation form, the audience was evenly divided in their interest - half intending to build a house, the other half for future use (undefined). Only a few people had an interest in renovation of an older home. The evaluation was again very favorable. Of special note is that all respondants thought that the workshop manuals were a valuable addition to the presentation.

Significant progress was made on preparation of the two energy factsheets. A major step was taken on the woodstove catalyst factsheet by holding a meeting with a representative of a major catalyst manufacturer located in Atlanta. Information gained from this meeting helped to fill in gaps existing in technical and trade literature. The factsheet is in rough draft form including concepts for artwork.

The residential furnace factsheet has been more difficult to write due to the diversity of equipment (e.g., comparing heat pumps which also air-condition to furnaces which only supply heat) and political considerations. We have managed, nonetheless, to produce a rough draft. More cost data is needed and will be procured in early September. Meetings will be held with the gas and electric companies for review after review by OER. Both factsheets will be delivered to OER for review in mid-September.

A meeting was held with Phil Whitlow (OER), Mike Walker (Georgia Dept. of Education), and other Dept. of Education personnel. The topic of discussion was a series of workshops for VO-ED construction trades teachers. They want four workshops, which in addition to the above referenced Lockheed workshop and the October 6 workshop in Gwinett County, will put us one workshop over the contractual limit of five. A letter authorizing increased funding will be needed, as well as reevaluation of the need for other workshops outside of those for the VO-ED teachers.

Summary of Workshop Evaluations

Lockheed/Georgia (n = 20) (Place)

August 23, 1983 (Date)

*1. How did you first hear about this course?
17 a. Received brochure or poster
0 b. Saw a poster
0 c. Newspaper announcement or article
0 d. Radio or television announcement
3 e. Recommended by friend or organization
1 f. Other:
NMA flyer--Lockheed

2. The level of the material presented in the course was
0 a. Much too advanced
0 b. Too advanced
19 c. About right
1 d. Too basic
0 e. Much too basic

3. The content of the material presented in the course was
16 a. Exactly what I was looking for
4 b. Somewhat related to my interests, but not entirely
0 c. Interesting, but not what I wanted
0 d. Mostly useless to me

4. The written materials that were handed out were
20 a. A valuable addition to the presentation
0 b. Interesting, but not well integrated with the presentation
0 c. Not very helpful

5. Which statement best describes your overall rating of the course?
17 a. It was very valuable.
3 b. Some parts were valuable, but others were not.
0 c. It was a waste of time.

* 6. What was your purpose in attending the class?
1 a. To develop myself professionally in my present work
12 b. Personal interest, to expand my knowledge of the subject for possible future use
0 c. I intend to buy a house
12 d. I intend to build a house
3 e. I am renovating an existing house
5 f. I want to decrease utility bills

(7-9) Please indicate your evaluation of the instructor:

Knowledge of subject		Attitude toward students		* Effectiveness	
17	a. Superior	15	a. Superior	16	a. Superior
3	b. Good	4	b. Good	5	b. Good
0	c. Average	1	c. Average	0	c. Average
0	d. Fair	0	d. Fair	0	d. Fair
0	e. Poor	0	e. Poor	0	e. Poor

*Note: The total is more than 20 on these items because some respondents gave multiple answers.

Summary of Workshop Evaluations (cont.)

Written Comments

10. What would have most improved this course? Add any additional comments.

- Additional 3 hours to expand course material.
- More time perhaps!
- Note to #9 (instructor's effectiveness of teaching): Additional time for clarification and questions without having to move too fast through material.
- Extra time (e.g., second evening). Added to #2 (level of material): Excellent.
- Some more "exotic" devices--heat storage system, cost/payback, etc.
- Use microphone or speak louder.
- Could have used a mike for volume.
- More time with more advanced thorough materials.
- A martini!

A-3462

Monthly Progress Report
September 1983
Contract A-3462-000
Homebuilders Energy Conservation Project

No workshops were held this month. Planning for the VO-Tech teachers workshops continues with Mike Walker of the Georgia Department of Education.

The woodstove catalyst factsheet was reviewed and edited and arrangements made for the drawings to accompany it. The final copy and drawings will be completed and transmitted to OER in October.

The Home Furnace Factsheet was sent to OER for review. Questions which remain are the best way to handle comparisons of heat pumps and gas furnace/ air conditioner combinations, recalculation using projected 1983 fuel costs, and review of heat pump seasonal efficiency data with the Georgia Power Company. When these items are completed and OER is satisfied with the product, a review by the gas and electric utility companies will be done to assure that the data contained in the factsheet is accurate.

A-3462

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
Atlanta, Georgia 30332

November 1, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street
Suite 615
Atlanta, GA 30334

Re: Georgia Tech Project A-3462-000
Homebuilders Energy Conservation Project

Dear Robin,

I'm pleased to report that the Woodstove Catalyst Factsheet was completed and delivered this month. The Gwinett County workshop went smoothly on 10/6/83, and we are gearing up to finish the Home Furnace Factsheet in November.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/pk

Enclosure

Monthly Progress Report
October 1983
Contract A-3462-000
HOMEBUILDERS ENERGY CONSERVATION PROJECT

The Gwinnett County workshop was presented on October 6, 1983, at Gwinnett High School, sponsored by the Continuing Education Department. Approximately 15 people attended. An agenda is attached, as well as a summary of the workshop evaluation. The results are positive, and it seems the presentation was in tune with the needs of the audience. A letter from one of the attendees, L.A. Diffenderfer with the Jackson Electric Membership Corporation, is attached.

Plans for the Vo-Tech teachers workshops were finalized this month. The schedule is shown below.

Date	Place
November 1	Jesup
November 2	Albany
November 15	Athens
November 17	Marietta

All are evening workshops, with dinner at 5:00, and presentations from 6:00 to 9:00 PM. Mike Walker with the Georgia Department of Education is the organizer. These four workshops plus previous ones at Gwinnett County and Lockheed total six, are one more than the contract calls for. An alteration in the contract and funding will be required by November.

The Woodstove Catalyst Factsheet was retyped and the artwork completed. It has been delivered to OER for typesetting and publication.

The factsheet on Home Furnaces was reviewed, but due to time constraints on personnel, it was not completed. Work will resume on it in November.

Georgia Tech was quoted in an Atlanta Journal/Constitution article (10/23/80) based on the Homebuilders project, and the "Solar Collector"

published by the Georgia Solar Coalition used some of the art work from the project for their cover (also attached). Tom McGowan, acting as a consultant, gave two presentations at the GSC's Solar Building Institute on 10/21/83 on energy conservation and woodstoves. Jeff Watson, a graduate research assistant, attended the opening of the Atlanta Gas Light Company's "Energy Wise" demonstration house on 10/14/83.

Jackson
Electric Membership Corporation

Headquarters
JEFFERSON, GEORGIA
District Offices
GAINESVILLE,
LAWRENCEVILLE, NEESE

October 12, 1983

Thomas F. McGowan, P. E.
Chief, Energy Technology Branch
Engineering Experiment Station
Room 215, O'Keefe Building
Georgia Institute of Technology
Atlanta, GA 30332

Dear Mr. McGowan,

My thanks to you for presenting such an informative program at the Energy Efficient Home Construction Workshop at North Gwinnett High School on Thursday evening, October 6. Your presentation was skillfully developed and obviously favorably received by those in attendance. How wonderful to make the acquaintance of a well informed resource-person in the field of energy technology!

Please inform me of future programs provided by our Energy Technology Branch as appropriate in consideration of our interests at Jackson Electric Membership Corporation. Also, allow us to be a resource for you for your information about services offered by EMC's in the area of energy conservation in the home.

Sincerely,

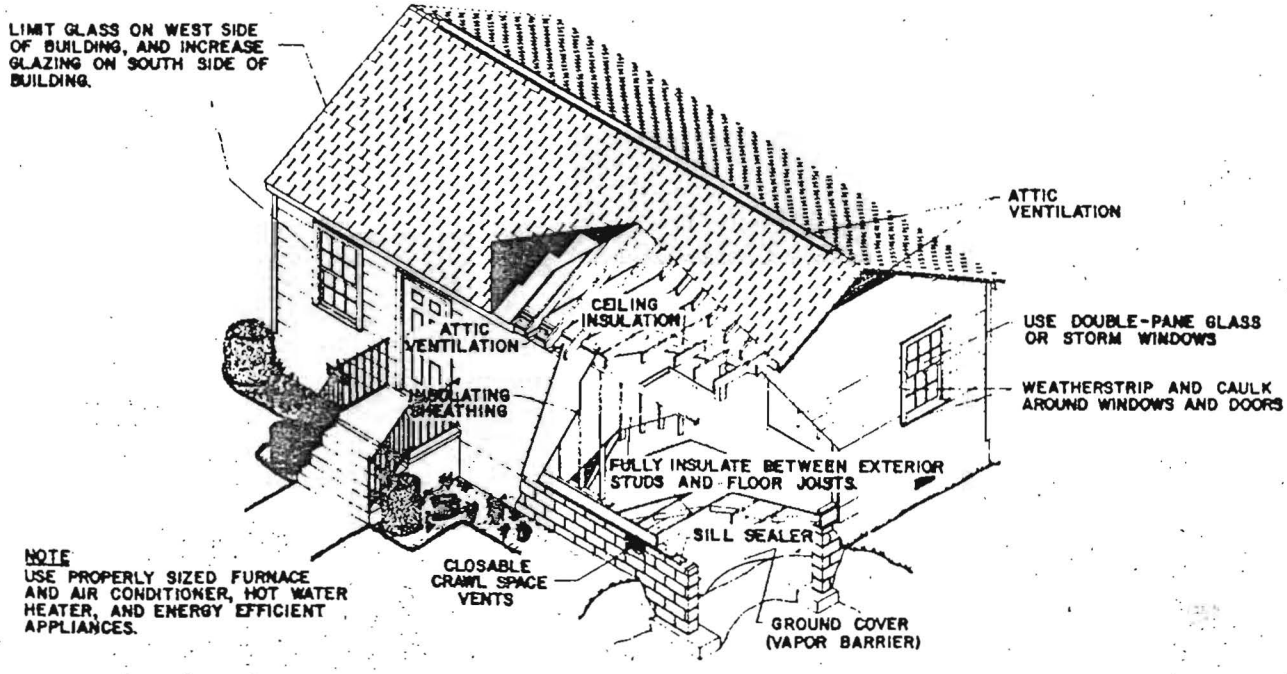
Leigh Ann Diffenderfer
District Home Service Advisor
Lawrenceville District

LAD/sb

THE SOLAR COLLECTOR

Published Quarterly by the Georgia Solar Coalition — Fall 1983

Energy conservation— **It pays to save**



From **Homebuilders Energy Pocket Guide** by Georgia Institute of Technology Engineering Experiment Station.

Work Parties at Southface

October 15
November 19
December 3 & 4
December 10

158 Moreland Avenue
10 am - 5 pm

Table of Contents

Answers to common insulation questions

□ HOW TO WEATHERSTRIP 10J

The rising cost of utility bills has made adequate insulation a must — even in the South. At one time inexpensive fuels caused few people in this part of the country to worry about insulating their homes.

And what's adequate today may not be enough in a few years as energy costs continue to soar.

The questions still most commonly asked concern what kind of insulation to use and how much to put where in order to cut heating and cooling bills.

The common insulations used in Georgia are fiberglass, rock wool and cellulose. All are sold in long rolls called blankets, in precut lengths (4-8 feet) called batts and in loose-fill bags.

An insulation's R-value, how resistant the material is to heat loss, is written on all packages. The higher the R-value, the less heat that will pass through the material.

Where you live in Georgia and the type of fuel you use to heat your home is a factor in how much insulation you need. The cost of insulation usually can be recovered in fuel savings within four years, sometimes less.

Doing it yourself

Many homeowners do the work themselves and save at least half the cost of hiring someone to do the job. Here are some tips:

- Be sure to wear gloves and a breathing mask.
- Be careful not to block the vents which allow ventilation in the attic.
- If you have no insulation in your attic, you should buy it with a face (foil or kraft paper backing) that creates a vapor barrier between the ceiling and attic space. This barrier reduces the chance of condensation caused if warm air from the house hits the cold air in the attic. Wet insulation isn't effective.

If you are going to pour loose insulation, make a vapor barrier with plastic sheeting on the floor before pouring.

- Buy unfaced insulation if you are adding to insulation. Faced insulation placed on top of other faced insulation can create a moisture pocket — making the material useless and possibly damaging your home.
- Unfaced batt and blanket insulation can be added on top of loose filled.

Types of insulation

Fiberglass. Comes in blankets, batts and loose fill. Blankets of fiberglass are the most popular of all types of insulation among do-it-yourself homeowners. These blankets can be purchased in most home improvement and building supply stores. Advantages are its relative inexpensive cost and its fire resistance.

You can expect to pay $11-$13 for 15-inch-wide, unfaced blankets that have an R-19 value and will cover 40-49 square feet. A disadvantage is the particles can irritate the skin.

Rock wool. Comes in blankets, batts and loose fill. However, it isn't as available to the do-it-yourselfer as the fiberglass. At some lumber stores you can buy loose fill for less than $7 a bag. If you buy more than 30 bags you can borrow a blower, with a deposit, to install it. It is fire resistant. Particles can irritate skin, and it is best to blow rock wool in rather than pour it.

Cellulose. Comes in blankets, batts and loose fill. Fine consistency permits loose-filled insulation through small access holes. It does not irritate the skin. Cellulose also is not as available to the do-it-yourselfer, but is widely used by home insulation firms.

Many in the insulating business say cellulose is the best of all because it takes less material to reach the same R-value. At one time there was a problem with cellulose being flammable, but those who install the product say the manufacturers who were making the product improperly are no longer in business.

How much insulation, where

Attic. Georgia Power Co. recommends R-30 for homes throughout the state. Atlanta Gas Light Co. recommends R-30 for North Georgia, R-22 for Middle Georgia and R-19 for South Georgia. FHA-HUD accepts R-19 for homes in the Atlanta area.

A random check with companies who insulate homes and sell insulation to the do-it-yourselfer showed that R-19 is what most homeowners request.

Air-conditioned homes benefit greatly in the summer from additional insulation in the ceiling because of the intense heat in the attic.

The first 6 to 9 inches of insualtion in your attic will have an R-19 value, depending on the type you use, and is where you will realize the biggest savings on heat loss, about 80 percent, according to Tom Bradley, director of research and marketing for the Atlanta Gas Light Co. Adding insulation after that will result in additional savings, but they will be small.

Walls. Insulating walls of an existing home is expensive and difficult, and while it does reduce heat loss, it isn't cost effective in most homes. But homes designed with a great deal of exterior wall space can benefit in fuel savings.

For new construction or room additions — when insulation is easy to install — R-11 to R-15 is recommended.

Floors. Not all homes should be insulated under the floors. Never insulate floors above heated or partially heated areas such as the basement.

R-11 is recommended for unheated crawl spaces. The job is messy, but it can be done by the homeowner. Batts or blankets are installed between the floor joists, with the vapor barrier up. Staple wire mesh or chicken wire to the bottom of the joists and slide the batts or blankets onto it.

The job is easier if you work in small, easy-to-handle pieces. Be sure you have adaquate ventilation, such as a portable fan, while you are working.

You also need to cover the earth with a 4 or 6 mil plastic sheeting, which will act as a vapor barrier and keep the moisture in the earth from rising and making the insulation damp.

Hiring someone

To hire someone to increase your existing insulation to an R-19 value using loose-filled fiberglass in a 1,500-square-foot house costs $350-$650 — depending on the firm you hire.

The cost of rock wool for the same amount of space is $350-$500. Cellulose installed runs $400-$500. ■

— Jean Tyson

WEEKEND PROJECT: Insulating attic is one of the biggest ways to save energy, cut utility bills.

R-Value Comparisons

R-VALUE	BATTS OR BLANKETS	LOOSE FILL		
	Rock Wool and Fiberglass R-3.2/In.	Fiberglass R-2.2/In.	Cellulose R-3.7/In.	Rock Wool R-2.5/In.
R-9	3"	4"	2½"	3½"
R-11	3½"	5"	3"	4½"
R-19	6"	9"	5½"	7½"
R-22	7"	10"	6"	9"
R-26	8½"	12"	7"	10½"
R-30	9½"	14"	8"	12"
R-38	12"	17½"	10½"	15½"

Note: All R-values are approximate
Source: Georgia Tech Engineering Experiment Station

AGENDA

ENERGY EFFICIENT HOME CONSTRUCTION WORKSHOP
Thursday, October 6
Gwinnett High School

6:30 p.m.	Introduction by Gay Clyburn Continuing Education
6:45 p.m.	Presentation by Tom McGowan Georgia Tech
	Insulation (Chapter 1) QUESTIONS Infiltration Control and Fenestration (Chapter 2) QUESTIONS
7:45 p.m.	Coffee Break
8:00 p.m.	HVAC, Equipment, State Energy Code (Chapters 3, 9) QUESTIONS Woodstoves (Chapter 7) QUESTIONS The Energy Package--A Summary (Chapter 5) QUESTIONS
9:30 p.m.	Finish

Presented by
Thomas F. McGowan, P.E., Georgia Tech

Sponsored by
The Georgia Office of Energy Resources

Summary of Workshop Evaluations

Gwinnett High School (Place) — October 6, 1983 (Date)

(Total Of 12 Respondants)

1. How did you first hear about this course?
   - 5 a. Received brochure or poster
   - ___ b. Saw a poster
   - 3 c. Newspaper announcement or article
   - ___ d. Radio or television announcement
   - 2 e. Recommended by friend or organization
   - 2 f. Other: Hand out at school from wife.

2. The level of the material presented in the course was
   - 1 a. Much too advanced
   - ___ b. Too advanced
   - 11 c. About right
   - ___ d. Too basic
   - ___ e. Much too basic

3. The content of the material presented in the course was
   - 12 a. Exactly what I was looking for
   - ___ b. Somewhat related to my interests, but not entirely
   - ___ c. Interesting, but not what I wanted
   - ___ d. Mostly useless to me

4. The written materials that were handed out were
   - 12 a. A valuable addition to the presentation
   - ___ b. Interesting, but not well integrated with the presentation
   - ___ c. Not very helpful

5. Which statement best describes your overall rating of the course?
   - 11 a. It was very valuable.
   - ___ b. Some parts were valuable, but others were not.
   - ___ c. It was a waste of time.

6. What was your purpose in attending the class?
   - 3 a. To develop myself professionally in my present work
   - 6 b. Personal interest, to expand my knowledge of the subject for possible future use
   - ___ c. I intend to buy a house
   - 6 d. I intend to build a house
   - ___ e. I am renovating an existing house
   - 2 f. I want to decrease utility bills

(7-9) Please indicate your evaluation of the instructor:

Knowledge of subject	Attitude toward students	Effectiveness
11 a. Superior	10 a. Superior	11 a. Superior
1 b. Good	2 b. Good	1 b. Good
___ c. Average	___ c. Average	___ c. Average
___ d. Fair	___ d. Fair	___ d. Fair
___ e. Poor	___ e. Poor	___ e. Poor

A-3462

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
Atlanta, Georgia 30332

December 12, 1983

Ms. Robin Meyer
Georgia OER
270 Washington Street
Suite 615
Atlanta, GA 30334

Re: Georgia Tech Project A-3462-000, Homebuilders Energy Conservation Project

Dear Robin:

Enclosed is the November 1983 progress report. Major highlights are the completion of the entire series of workshops and review of the Home Heating System Factsheet with the Georgia Power Company. Work in December consists of a final report and completion of the factsheet.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/pk

Enclosure

Monthly Progress Report
November 1983
Contract A-3462-000

HOMEBUILDERS ENERGY CONSERVATION PROJECT

Four workshops were presented to Vo-Tech teachers in Jesup, Albany, Athens, and Marietta. These were arranged by Mike Walker and Earl Williams with the State Department of Education. Total attendance was in the range of 130 people. The format of the Energy Conservation Presentation was adjusted to fit the audiences' needs. Most notably, the last two segments on Packaging Energy Efficiency and Marketing were deleted, and more time allowed for technical questions and discussion.

The results of the questionnaires distributed by the State Department of Education are encouraging. The ratings, results, and suggestions for future work from 26 responses have been summarized and are attached.

The Jesup meeting was first. I learned that the meeting was too long (including on-site logistical delays) and decided to cut some material after conferring with the teachers and reviewing the response sheets. The second meeting in Albany was an improvement in the seven items related on the response sheet, with Athens and Marietta showing similar results.

Major items recurring in the suggested topics for future workshops:

1. Solar--active and passive
2. Woodstoves
3. New construction methods, rennovation, and energy efficiency
4. Plumbing, wiring, framing, painting, masonry, commerical and industrial construction.

Major comments and teacher needs:

1. Need information packets for students
2. Need teaching modules (slides, tapes, study guide, competency lists,

show and tell materials)

3. Exerpt material from book for class use (Do's and Don'ts, etc.)
4. More workshops of this type in all areas, not just construction trades.

To summarize the overall response of the teachers and administrators, they liked the presentation, want more like it in different areas, and need teaching aids based on the slides, materials, and publications. This is an area that OER and the State Department of Education might consider for future projects.

The other major effort this month was the review of the Home Heating System Factsheet with the Georgia Power Company. Two meetings were held with Bill Starrs, who supplied more data on heat pump efficiency ratings, power costs, and feedback from installers on equipment life. We have used these in finalizing our cost data and editing the factsheet. We will meet with the Atlanta Gaslight Company in December to review the material to be followed by transmittal of the draft to OER.

The remaining work to be completed in December is the writing of the final report.

SUMMARY

ENERGY EFFICIENT RESIDENTIAL CONSTRUCTION SEMINAR

RESPONSE SHEET

Educational Category: Site: Jesup (N = 24)

Construction Cluster	13
Other Construction Area	0
Administrator/Teacher Educator	10
No answer	1

Please rate the following:	Poor 1	Fair 2	Average 3	Good 4	Excellent 5
1. Meeting location	(0)	(0)	(1)	(12)	(11)
2. Dinner as a function of the seminar	(0)	(0)	(0)	(6)	(18)
3. Meeting facility	(0)	(1)	(1)	(7)	(15)
4. Time of meeting (time of day)	(1)	(5)	(3)	(8)	(7)
5. Length of presentation in relation to content	(0)	(3)	(9)	(6)	(6)
6. Relevance of information presented	(0)	(0)	(3)	(9)	(12)
7. Use of material in your school	(0)	(4)	(5)	(8)	(7)

List topics for future workshops of this type.

1. _____

2. _____

Comments: _____

_____

RESPONSE SHEET SUMMARY (cont.)

Suggested topics for future workshops:

- Student recruitment--T & I programs. Involve other T & I areas.
- New materials on plumbing and electrical.
- More information on solar technology.
- Types of framing (wood, alum., etc.).
- Electrical. Plumbing.
- Solar heat. Move on each area in construction.
- Changing building products/techniques.
- CPVC plumbing. Running live work out of classrooms.
- Information on new building products.
- New methods and means of plumbing. Carpentry--house framing--costs cutting.
- Solar design (active and passive). Alternative cooling systems for South Georgia.
- Plumbing.
- Computers in T & I programs.

Comments:

- Good format--positive meeting--enjoyed it!
- I liked the workshop.
- Limit hours to those advertised.
- Try to have these and other materials duplicated for classroom use. Presentation was relevant and well presented.
- This type of meeting is very good.
- Good discussion. Needs to be condensed--too much time. Work day.
- Outstanding presentation--very intelligent instructor--a little long...
- Very helpful and informative.
- Enjoyed it.
- I learned much useful information about energy efficient construction. The actual application to teaching may not come about immediately, but they helped me to know more about my area.
- This was very good. I could use this in my class. Insulation, solar heating water heater.

RESPONSE SHEET SUMMARY (cont.)

Comments (cont.):

- Enjoyed! Very good presentation--very helpful information. Teaching materials: insulation comparisons book is very helpful as teaching resource slides.
- I enjoyed myself and hope to come again, and I did learn something.
- Excellent presentation--material and delivery outstanding.
- This Energy Pack is good for second and third year students--we need instructional materials for this subject.
- Programs be developed for secondary and post-secondary classes, payback, insulation installation and types, packaged insulation and payback.
- Very good but need info and material packets for students.
- Good product information with limitations and advantages of projects. Need more information for students.
- Need more of these types of in-service for all our instructors.
- Potential of program is great. Additional material for use in class is needed.
- Was well presented. Of a real value for use in construction cluster.

SUMMARY

ENERGY EFFICIENT RESIDENTIAL CONSTRUCTION SEMINAR

RESPONSE SHEET

Educational Category: Site: Albany (N = 28)

Construction Cluster	14 *
Other Construction Area	2
Administrator/Teacher Educator	11 *
Other:	
Visitor (wife)	1
No answer	1

Please rate the following:	Poor 1	Fair 2	Average 3	Good 4	Excellent 5
1. Meeting location	(0)	(0)	(0)	(3)	(25)
2. Dinner as a function of the seminar	(0)	(0)	(0)	(2)	(26)
3. Meeting facility	(0)	(0)	(0)	(2)	(26)
4. Time of meeting (time of day)	(1)	(0)	(0)	(8)	(19)
5. Length of presentation in relation to content	(0)	(0)	(0)	(7)	(21)
6. Relevance of information presented	(0)	(0)	(0)	(4)	(24)
7. Use of material in your school	(0)	(0)	(1) (No answer = 1)	(11)	(15)

List topics for future workshops of this type.

1. _____

2. _____

Comments: _____

_____

*One person checked both categories.

RESPONSE SHEET SUMMARY (cont.)

Site: Albany

Suggested topics for future workshops:

- More information on wood heating as a primary source of heat.
- Paint and painting. Cost of the additional add-ons.
- State developed packages available to schools in relationship to solar energy--teacher training--teacher visitations to different manufacturers of materials--more progressive constructors--update equipment list to relate to these topics.
- Heating, ventilating and cooling.
- Plumbing.
- Stain, sealers, masonry, etc. Paint, similar products, use, surface prep., i.e., paint removal. Plastics in construction, P.V.C., paint windows, etc., etc.
- House wiring, ventilation.
- Solar water heater and wind generators. Older home restoration vs. new construction.
- Electro-mechanical cluster.
- Updating on new materials that are available. Computer application for small contractors.
- Get more in-depth on wood burning stoves and safety precautions.
- New types of homes in residential construction. Changes in building materials, and needs for the students that are to be employed.
- More on energy efficiency. Future workshops in all areas related to cluster concept.
- Roof framing. Plumbing installations, water supply and (DWV) draining waste and ventilation.
- Curriculum trends from State Dept. Course presentations--audio-visuals, etc.
- Motivation of students.
- Solar. Underground.
- Fixtures and appliances (new vs. old). Industrial construction--techniques.
- In the area of transportation and health. One on appliances.

RESPONSE SHEET SUMMARY (cont.)

Site: Albany

Comments:

- This has been the most informative session that I've been to in quite a while. I hope to see more of these.
- An excellent presentation. Subject was known and Tom knew how to present it.
- More time for questions.
- Excellent workshop--very knowledgeable leader. Presentation not boring, full of good information.
- Good job!
- Truly a wise use of money--most effective "workshop" in a long time. The models would best represent concepts to the kids; can be self-made.
- Very good. Well worth the 60 mile drive.
- Workshop was very informative. I plan to make immediate use of some things I learned in a church building I presently have under construction.
- I appreciate the opportunity to attend a seminar of this quality. The presentation was one of the most knowledgeable we have had for our construction teachers.
- The presentation was clear and concise. Not a lot of new information but what was presented was done well.
- Excellent meeting.
- An excellent seminar that was well planned. Please, please more of the same for Southwest Georgia.
- Very enjoyable and most informative. More of these meetings needed with supt. included to make them aware of needs and monies needed to teach these areas.
- I thought the meeting was well presented and worthwhile. Thanks.
- Very good.
- The presentation was very informative. More programs of this type should be held. We should raise the level of information in this area for the instructor.
- Material excellent--presenter well prepared--information helpful to construction students!
- This was the best seminar I have ever been to (including G.V.A.).
- Very good seminar. Seminars of this type should be presented for all occupational programs.

RESPONSE SHEET SUMMARY (cont.)

Site: Albany

Comments (cont.):

- Very good.
- Excellent--time well spent.
- Very good.
- Lesson adaptations for high school use would be nice.
- It was simple and "to the point." Even a housewife could understand it.
- Very good presentation--useful, one of the best that I have attended. What would the possibility be of getting the slide set to go with the book and its cost?

SUMMARY

ENERGY EFFICIENT RESIDENTIAL CONSTRUCTION SEMINAR

RESPONSE SHEET

Educational Category: Site: Athens (N = 32)

Construction Cluster [21] *

Other Construction Area [1]

Administrator/Teacher Educator [11] *

Please rate the following:	Poor 1	Fair 2	Average 3	Good 4	Excellent 5
1. Meeting location	(0)	(3)	(4)	(18)	(7)
2. Dinner as a function of the seminar	(0)	(0)	(0)	(7)	(23)
		No answer = 2			
3. Meeting facility	(3)	(8)	(6)	(15)	(0)
4. Time of meeting (time of day)	(0)	(3)	(2)	(22)	(5)
5. Length of presentation in relation to content	(0)	(0)	(0)	(18)	(14)
6. Relevance of information presented	(0)	(0)	(1)	(8)	(23)
7. Use of material in your school	(0)	(1)	(3)	(18)	(9)
			No answer = 1		

List topics for future workshops of this type.

1. _____

2. _____

Comments: _____

_____

*One person checked both of these categories.

RESPONSE SHEET SUMMARY (cont.)
Site: Athens

Suggested topics for future workshops:

- Masonry techniques.
- Building materials.
- Building materials.
- New and better types of plumbing. New and better types of masonry.
- Energy-saving devices for home use.
- Energy efficient appliances in homes.
- Engineering of trusses (all types). New home building methods (update).
- New nethods of construction. Commercial construction--this is where the jobs are now.
- More on energy conservation. Detailed information on improving existing homes.
- Electrical code.
- Retrofitting of existing structures. Career development in energy (?).
- Repairing existing structures.
- Plumbing.
- Electric.
- Feasibility of constructing residential homes for sale (from construction cluster).
- Wood furnace systems.
- Energy efficient house design.
- Workshop on figuring the R factor of a home.

Comments:

- Very good--basic information covered to the point.
- Could have copies of suggestions "Do's" and "Don'ts" to give out. Could have copies of list of instructional materials.
- Very well done, extremely beneficial.
- Very good seminar.
- Very good presentation with well-informed teacher.
- This clinic was the best we've had. It is relevant and functional.

RESPONSE SHEET SUMMARY (cont.)
Site: Athens

Comments (cont.):

- Would like to see some type of expansion to use in secondary schools.
- Very good.
- Enjoyed speaker.
- Good coverage.
- Enjoyed everything. Good speaker.
- Excellent speaker--down to earth and quite knowledgeable.
- Very informative.
- Would like to have this workshop presented at GVA. We also need more workshops of this type for our teachers.
- Great informative speaker.
- I found the presentation to be very relevant to today's needs.
- Great.
- Individual info sheets for purchasing. Implement into state placement slide programs--those obvious energy efficient construction procedures.

SUMMARY

ENERGY EFFICIENT RESIDENTIAL CONSTRUCTION SEMINAR

RESPONSE SHEET

Educational Category: Site: Marietta (N = 42)

Construction Cluster	20
Other Construction Area	5 *
Administrator/Teacher Educator	17 *
Other (unspecified)	1

Please rate the following:	Poor 1	Fair 2	Average 3	Good 4	Excellent 5
1. Meeting location	(0)	(0)	(4)	(25)	(13)
2. Dinner as a function of the seminar	(0)	(0)	(0)	(12)	(30)
3. Meeting facility	(0)	(2)	(2)	(25)	(13)
4. Time of meeting (time of day)	(0)	(0)	(5)	(29)	(8)
5. Length of presentation in relation to content	(0)	(1)	(2)	(21*)	(19*)
6. Relevance of information presented	(0)	(0)	(2)	(8)	(27)
7. Use of material in your school	(0)	(1)	(11)	(17)	(10)

No answer = 3

List topics for future workshops of this type.

1. _____

2. _____

Comments: _____

_____

*One person checked both of these categories.

RESPONSE SHEET SUMMARY (cont.)
Site: Marietta

Suggested topics for future workshops:

- Passive solar construction workshop.
- Modular homes. Solar energy.
- Wiring service entrances on site and other electrical problems. Brick a house on a job site, 1 mason to 5 carpenter instructors.
- Building material new to market. Plumbing.
- Alternate small power systems, hydro, wind.
- Single floor system--floor truss.
- Cover new, successful trends in construction--single plates, single floor, etc.
- Additional information on construction.
- Plumbing specifications and codes.
- Solar heating. Electrical installation.
- Solar.
- Plumbing.
- Home construction.
- Solar--passive and active.
- Plumbing. Electrical.
- Solar installations. Modular construction and fabrication.
- Passive solar energy.
- Include other areas (metals, transportation, health occupations).
- Plumbing workshop--code standardizing.
- Organization and management of cluster.
- Plumbing and topics for construction cluster.
- Other T & I areas.
- In-depth study of solar heating and cooling.

Comments:

- I enjoyed the class and would like to see other meetings like this with different parts of the house that has been updated for today's economy.
- This is a welcome improvement to our programs.
- Enjoyed it and was well worth time and trip. Excellent.

RESPONSE SHEET SUMMARY (cont.)
Site: Marietta

Comments (cont.)

- This was excellent, and I think this is the best thing our instructors have. Could we do this in other programs?
- Drafting cluster (related to construction) could have been included, insulation is specified on plans.
- Appreciate all the updated information!
- I think the area covered was very well presented.
- Very good--interesting and helpful. Would like to see workshops relating new use of masonry material: Dryvit.
- Good materials and presentation.
- Excellent--should have more.
- Excellent--need to have more of this type information.
- Very well organized. Tom did an excellent job.
- Good--but we need to get more advanced to be leaders in the field.
- Excellent presentation.
- Excellent workshop--I'm happy we finally had a workshop that wasn't a waste of time.
- Excellent presentation. Could be set up for Fri. night and Sat. type of presentation.
- Outstanding.
- Need instructional units relative to subject.
- Very good presentation.
- Right-on.
- Very good. Very beneficial.
- It would be good to have an individualized teaching unit on the subject.
- Very good.
- I greatly enjoyed this informative seminar and would like to see more.
- Very good workshop.
- One of the best workshops I have attended.
- Workshop excellent, and state should use more of these in all T & I, Health Occupation and Business areas.

A-3462

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
Atlanta, Georgia 30332

December 19, 1983

Ms. Robin Meyer
Georgia Office of Energy Resources
270 Washington Street
Atlanta, GA 30334

RE: Project A-3462, Homebuilders Energy Conservation Project

Dear Robin,

Enclosed is the final report for the Homebuilders Energy Conservation Project. Per your request and contract requirements, it includes an estimate of the "energy savings" which may result from our efforts. The estimate for this project is 2.52×10^{10} Btu/year, saving homeowners $210,000 per year in utility bills.

I enjoyed doing the project again this year. Please let me know if you need any further assistance in this area.

Sincerely,

Thomas F. McGowan
Chief, Energy Technology Branch

TFM/lmk
Encl
cc: Mr. Phil Whitlow

FINAL REPORT

Homebuilders Energy Conservation Project

Prepared For The

Georgia Office of Energy Resources

by

Thomas F. McGowan
Technology Applications Laboratory
Georgia Institute of Technology
December 1983

Project A-3462-000

Final Report--December 16, 1983
Project A-3462
Homebuilders Energy Conservation Project
Contract Period 12/15/82 - 12/31/83

Summary

This project utilized the educational materials prepared under a previous project (A-3169) and consisted of 13 workshop presentations, preparation of 2 energy factsheets, updating workshop materials and assisting OER as needed on energy topics. This work is discussed in more detail below.

1. Distribution of Manuals

Two manuals are used in the workshops, "A Builder's Guide to Energy Efficient Homes" and the "Homebuilders Energy Pocket Guide." These were prepared under the previous project, have been reprinted and continue to be distributed. Approximately 3,000 copies of the large manual have been printed to date and another 1,500 may be printed for distribution by Georgia Power. Approximately 2,000 copies of the vestpocket edition have also been printed. Requests have been received from 25-30 states, particularly those in the Northeast and Northwest, plus requests from Alaska, Canada, Samoa, India and England.

2. Workshop Presentations

New slides and materials were procured to update the workshop presentations. Approximately 120 slides are used for a 3-hour workshop format, supplemented by insulation materials, door and window models, energy conserving devices, etc. The manual and presentation are in parallel, allowing easy reference and notetaking.

The workshops were expanded to include homebuilders, owner-builders, owner-buyers (contract built and speculative), housing rehabilitation specialists and secondary school vocational education teachers. A listing of the workshops is given below.

Workshop Date and Place	Type of Audience	Approximate Attendance
Nov. 17, Marietta, GA	High School Vo-Ed Teachers	42
Nov. 15, Athens, GA	"	32
Nov. 2, Albany, GA	"	28
Nov. 1, Jesup, GA	"	24
Oct. 6, Gwinnett Cnty, GA	Homeowners, Owner-builders	15
Aug. 23, Lockheed, GA	"	45
July 21, Lockheed, GA	"	46
June 14, Athens, GA	"	30
May 31, Western Electric, Atlanta, GA*	"	110
May 12, Georgia Solar Energy Association, Atlanta, GA*	"	15
June 2, American Solar Energy Association, Minneapolis, MN*	Architects, Engineers	60
March 15, Tifton, GA	Housing Rehabilitation Specialists	27
Feb. 5, Kennesaw, GA	Homeowners, Owner-builders	17
	Total	491

*One-hour presentations

Questionnaires were distributed at each 3-hour workshop to help evaluate specific needs of each audience and to make changes and adjustments as needed. Summaries of the questionnaires have been provided with monthly progress reports.

3. Publicity and Public Service

We have responded to myriad phone calls and letters requesting general

and specific information on energy conservation techniques. Inquiries have spanned a wide range, including homeowners, subcontractors, builders, educators, and code officials.

The project has received press recognition on several occasions, including articles in the "Journal-Constitution" and the Georgia Solar Coalition's "Solar Collector."

4. Preparation of Energy Factsheets

Two factsheets were prepared. The first, on wood stove catalysts, is now in typesetting. It identifies the cost, benefits and proper operating procedures for catalysts which reduce air pollution as well as increase wood stove efficiency.

The second factsheet is a comparison of the costs of home heating systems. It includes fuel cost, maintenance and installation costs for natural gas, electric, heat pump, propane and fuel oil heating systems. Different efficiencies of new heating systems are taken into account in the analysis, and old, unusual furnaces and boilers are discussed. As of the writing of this report, it has been reviewed by both utilities and is in final draft form.

5. Energy Savings and Contract Funding

The contract was composed of a series of incremental funding for groups of workshops and technical support tasks. The total amount was $15,849. The cost to present the workshops was $32 per person attending.

My estimate of potential energy savings is 2.52×10^{10} Btu/year, saving homeowners $210,000 per year in utility bills. This is based on the following analysis:

A. 491 people attended the workshops.

B. Assuming that one half of these will be building a house (or having one built), using the information presented in the workshop.

C. Assuming an average home size of 1,600 square feet, with an energy savings as shown on p. 22 of "A Builder's Guide to Energy Efficient Homes."

D. And current fuel prices of 65¢/Therm ($6.50 per million Btu) for natural gas and 6.1¢ per kwh ($17.80 per million Btu) for electricity.

Natural Gas	(491 homes/2) x (1,000 - 340)Therm x 100,000 Btu/Therm = 16.2×10^9 Btu/year
Electricity	(491/2) x (6,160 - 2,330) kwh x 3,413 Btu/khw = 3.2×10^9 Btu/year
Total	$16.2 + 3.2 = 19.4 \times 10^9$ Btu/year
Total Dollar Savings	(16.2×10^9 Btu/year x $6.50/million Btu) + ($3.2 \times 10^9$ Btu/year x $17.80/million Btu) = $162,000 per year saved

E. Assuming that as a result of the approximately 1500 publications mailed out during this project, 5% of the recipients build an energy efficient home, an additional 75 homes will be built, adding 30% to the savings listed above, or a total of 25.2×10^9 Btu/year saved, and $210,000 per year saved.

F. Cost to serve each person at a workshop was $15,849/491 = $32.

6. Future Work

Many suggestions were offered by workshop participants for improving the information provided and answering specific needs. In addition, OER has brought up the need for additional services. These are listed below as a guide for future projects.

A. Update information in the manuals. (This work is under negotiation.)

B. Produce teaching aids for vocational education teachers including teaching modules, handouts, slide-tape shows, student competency lists and mock-ups (letter has been sent to Georgia Department of Education).

C. Assistance to OER and Department of Consumer Affairs on energy related products and consumer questions.